

**WHAT IS CLAIMED IS:**

1. A full-width array printhead comprising:
  - a first printbar comprised of a plurality of first die modules, for applying a first color, spaced substantially evenly apart so as to have gaps between each die module and located on a top surface of a first substrate,
  - a second printbar comprised of a plurality of second die modules, for applying a second color, different from the first color, spaced substantially evenly apart so as to have gaps between each die module and located on a bottom surface of the first substrate,
  - a third printbar comprised of a plurality of third die modules, spaced substantially evenly apart, on a top surface of a second substrate, wherein each of the plurality of third die modules is aligned with respect to the first die modules such that each substantially covers a gap between the first die modules; and
  - a fourth printbar comprised of a plurality of fourth die modules, spaced substantially evenly apart, on a bottom surface of the second substrate, wherein each of the plurality of fourth die modules is aligned with respect to the second die modules such that each substantially covers a gap between the second die modules.
2. The full-width array printhead of claim 1, wherein the third die modules and the first die modules both apply the same first color and/or the fourth color die modules and the second die modules both apply the same second color.
3. The full-width array printhead of claim 1, wherein the first substrate and the second substrate are vertically adjacent with no additional substrate there between.
4. The full-width array printhead of claim 1, wherein the first substrate and the second substrate are vertically spaced apart such that one or more additional substrates with die modules thereon are between the first and second substrates.
5. The full-width array printhead of claim 4, wherein the one or more additional substrates each comprise a printbar comprised of a plurality of die modules on each of a top surface and a bottom surface thereof.
6. The full-width array printhead of claim 1, further comprising:
  - a left edge of the plurality of first die modules; and

a right edge of the plurality of second die modules, wherein a print region extends from the farthest left edge of the plurality of first die modules to the farthest right edge of the plurality of second die modules.

7. The full-width array printhead of claim 1, further comprising:

a fifth printbar comprised of a plurality of fifth die modules, for applying a third color, different from the first and second color, spaced substantially evenly apart so as to have gaps between each die module and located on a top surface of a third substrate,

a sixth printbar comprised of a plurality of sixth die modules, for applying a fourth color, different from the first color, second color and third color, spaced substantially evenly apart so as to have gaps between each die module and located on a bottom surface of the third substrate,

a seventh printbar comprised of a plurality of seventh die modules, spaced substantially evenly apart, on a top surface of a fourth substrate, wherein each of the plurality of seventh die modules is aligned with respect to the fifth die modules such that each substantially covers a gap between the fifth die modules; and

an eighth printbar comprised of a plurality of eighth die modules, spaced substantially evenly apart, on a bottom surface of the fourth substrate, wherein each of the plurality of eighth die modules is aligned with respect to the sixth die modules such that each substantially covers a gap between the sixth die modules.

8. The full-width array printhead of claim 7, wherein the fifth die modules and the seventh die modules both apply the same third color and/or the sixth color die modules and the eighth die modules both apply the same fourth color.

9. The full-width array printhead of claim 7, wherein the first die modules and the fifth die modules both apply the same first color or third color and/or the second color die modules and the sixth die modules both apply the same second or fourth color.

10. The full-width array printhead of claim 7, wherein the first die modules and the seventh die modules both apply the same first color and/or the second color die modules and the eighth die modules both apply the same second color.

11. The full-width array printhead of claim 7, wherein the third die modules and the seventh die modules both apply the same first color or third color

and/or the fourth color die modules and the eighth die modules both apply the same second color or fourth color.

12. The full-width array printhead of claim 7, wherein the first substrate, the second substrate, the third substrate and the fourth substrate are vertically adjacent to each other in any order.

13. The full-width array printhead of claim 1, wherein the gaps between each of the plurality of first die modules of the first printbar are vertically aligned with the gaps between each of the plurality of second die modules of the second printbar and wherein the gaps between each of the plurality of third die modules of the third printbar are vertically aligned with the gaps between each of the plurality of fourth die modules of the fourth printbar.

14. The full-width array printhead of claim 1, wherein the gaps of the first printbar are vertically aligned with the gaps of the third printbar and the gaps of the second printbar are aligned with the gaps of the fourth printbar and further wherein the gaps on the second printbar and fourth printbar are not aligned with the gaps on the first printbar and/or the third printbar.

15. A nonbuttable printhead comprising a set of printbars, each printbar comprised of a row of a plurality of nonbuttable die modules in substantial alignment, the set of printbars including a total number of substrates (Y) equal to a total number of different colors (X) capable of being applied by the printhead, wherein a first printbar of the plurality of printbars having a first color of the total number of different colors (X) is located on a top surface of a first substrate and a second printbar of the plurality of printbars having a second color of the total number of different colors (X) is located on a bottom surface of the first substrate.

16. The printhead of claim 15, wherein the total number of substrates is two for a printhead that applies two different colors.

17. The printhead of claim 15, further comprising:  
a third printbar of the plurality of printbars having the first color of the total number of different colors (X) located on a top surface of a second substrate and a fourth printbar of the plurality of printbars having the second color of the total number of different colors (X) located on a bottom surface of the second substrate.

18. The printhead of claim 17, further comprising:

gaps between the plurality of nonbuttable die modules in substantial alignment on the top surface of the first substrate of the first printbar, wherein the plurality of nonbuttable die modules on the top surface of the second substrate of the third printbar are vertically aligned with the gaps on the top surface of the first substrate; and

gaps between the plurality of nonbuttable die modules in substantial alignment on the bottom surface of the first substrate of the second printbar, wherein the plurality of nonbuttable die modules on the bottom surface of the second substrate of the fourth printbar are vertically aligned with the gaps on the bottom surface of the first substrate.

19. The printhead of claim 17, wherein the row of the plurality of nonbuttable die modules mounted on the top surface of the first substrate is in substantial vertical alignment with the row of the plurality of nonbuttable die modules mounted on the top surface of the second substrate such that a left edge and right edge of each of the gaps on the top surface of the first substrate is substantially vertically aligned and overlapping with a left edge and right edge of each of the die modules on the top surface of the second substrate.

20. The full-width array printhead of claim 7, further comprising:

a ninth printbar comprised of a plurality of ninth die modules, for applying a fifth color, different from the first color, second color, third color and fourth color, spaced substantially evenly apart so as to have gaps between each die module and located on a top surface of a fifth substrate,

a tenth printbar comprised of a plurality of tenth die modules, for applying a sixth color, different from the first color, second color, third color, fourth color and fifth color spaced substantially evenly apart so as to have gaps between each die module and located on a bottom surface of the fifth substrate,

an eleventh printbar comprised of a plurality of eleventh die modules, spaced substantially evenly apart, on a top surface of a sixth substrate, wherein each of the plurality of eleventh die modules is aligned with respect to the ninth die modules such that each substantially covers a gap between the ninth die modules; and

a twelfth printbar comprised of a plurality of twelfth die modules, spaced substantially evenly apart, on a bottom surface of the sixth substrate, wherein

each of the plurality of twelfth die modules is aligned with respect to the tenth die modules such that each substantially covers a gap between the tenth die modules.